

## **SECTION 02710**

### **GRANULAR DRAINAGE MATERIAL**

#### **PART 1 GENERAL**

##### **1.01 SCOPE**

- A. This Section includes granular drainage material and placement.

##### **1.02 RELATED SECTIONS AND PLANS**

- A. Section 02100 - Surveying
- B. Section 02200 - Earthwork
- C. Section 02714 - Geotextiles
- D. Part 8 - Environmental Health and Safety, and Training Requirements
- E. Part 9 - Quality Assurance Requirements

##### **1.03 REFERENCES**

- A. Latest version of American Society for Testing and Materials (ASTM) Standards:
  - 1. ASTM C 136. Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - 2. ASTM D 2434. Standard Test Method for Permeability of Granular Soils (Constant Head).
  - 3. ASTM D 2487. Classification of Soils for Engineering Purposes (Unified Soil Classification System).
  - 4. ASTM D 3042. Standard Test Method for Insoluble Residue in Carbonate Aggregate.
- B. *"Off-Site Borrow Materials Geotechnical Evaluation Report"*, (Revision O), prepared by Parsons, June 1996. This report presents geotechnical data for potential off-site borrow sources for OSDF construction materials, including fine and coarse concrete aggregates, pea gravel, and riprap.

## **1.04 SUBMITTALS**

- A. For each source of granular drainage material, submit the following to the Construction Manager within 60 calendar days from Notice to Proceed for review:
  - 1. the source of the granular drainage material along with certification from the supplier that the granular drainage material meets the material requirements of this Section to include the test results from ASTM C 136, ASTM D 2434, ASTM D 2487 and ASTM D 3042 on granular drainage material from each source; and
  - 2. a 50-pound representative sample of granular drainage material for each source.
- B. Provide a list of equipment and description of construction methods for placement of granular drainage material in the Earthwork Work Plan specified in Section 02200.

## **1.05 HEALTH AND SAFETY REQUIREMENTS**

- A. Environmental, health and safety, and other training requirements shall be as specified in Part 8 of the Contract Documents.

# **PART 2 PRODUCTS**

## **2.01 MATERIALS**

- A. Furnish granular drainage material consisting of homogeneous crushed or angular material that is free of deleterious materials.
- B. Furnish granular drainage material for the leachate collection system (LCS) drainage layer, leachate detection system (LDS) drainage layer, granular protective layer at the Impacted Runoff Catchment Area, and cover drainage layer, classifying as GP in accordance with the Unified Soil Classification System (per ASTM D 2487), and having a gradation (per ASTM C 136) that meets the following requirements:

<u>Sieve</u>	<u>Total Percent Passing</u>
3/4 in.	100
1/2 in.	80 to 100
3/8 in.	40 to 75
No. 4	5 to 25
No. 8	0 to 10
No. 16	0 to 5
No. 200	0 to 2

- C. Furnish granular drainage material for the LCS drainage layer, LDS drainage layer, the granular protective layer at the Impacted Runoff Catchment Area having a minimum hydraulic conductivity of  $1 \times 10^{-1}$  centimeters per second (cm/s) and cover drainage layer based on laboratory permeability testing conducted in accordance with ASTM D 2434.
- D. Furnish granular drainage material for the LCS and LDS drainage corridors classified as GP in accordance with the Unified Soil Classification System (per ASTM D 2487), and having a gradation (per ASTM C 136) that meets the following requirements:

<u>Sieve</u>	<u>Total Percent Passing</u>
1-1/2 in.	100
1 in.	95 to 100
1/2 in.	25 to 60
No. 4	0 to 10
No. 8	0 to 5
No. 200	0 to 2

- E. Furnish granular drainage material for the LCS drainage corridor and LDS drainage corridor having a minimum hydraulic conductivity of 10 cm/s based on laboratory permeability testing conducted in accordance with ASTM D 2434.
- F. Furnish granular drainage material for the LCS and LDS drainage materials, LCS and LDS drainage corridors, and cover drainage layer having less than 5 percent loss of weight, when tested according to ASTM D 3042 at a pH of 4.

## **2.02 EQUIPMENT**

- A. Furnish equipment necessary to haul, place, spread, and compact granular drainage materials.

## **PART 3 EXECUTION**

### **3.01 MATERIAL PLACEMENT**

- A. Do not commence placement of the granular drainage material until the CQC Consultant has completed conformance evaluation of the granular drainage materials and performance evaluation of previous work, including evaluation of the Contractor's survey results for previous work.
- B. Construct the granular drainage material to the thicknesses, elevations, and locations shown on the Construction Drawings.
- C. Place the granular drainage material directly on top of the geotextile cushion, supplemental geotextile cushion, as shown on the Construction Drawings. Do not dump granular drainage material directly on the geotextile. Place the granular drainage material by dumping onto previously placed granular drainage material and then carefully spread using low ground-pressure equipment meeting the ground pressure requirements of Section 02714.
- D. Spread granular drainage material over the geotextile to cause the material to cascade over the geotextile rather than be shoved across the geotextile.
- E. Do not drive equipment directly on the geotextile cushion or supplemental cushion. Only use equipment to place, spread, and compact the granular drainage material that meets the ground pressure requirements of Section 02714.
- F. Place the granular drainage material in one loose lift.
- G. Compact the granular drainage material with one pass of equipment having ground-pressure less than 5 pounds per square inch. Use portable compactors in constricted locations and adjacent to structures.

### **3.02 CONSTRUCTION QUALITY REQUIREMENTS**

- A. The CQC Consultant will perform conformance testing on the granular drainage material to establish compliance with this Section. The conformance testing to be performed and the testing frequencies are given in the Construction Quality Assurance Plan, referenced in Part 9 of the Contract Documents.

### **3.03 SURVEY CONTROL**

- A. Survey the limits and elevations of the top of the granular drainage material layers in accordance with Section 02100.

### **3.04 TOLERANCES**

- A. Construct the LDS drainage layer, LDS drainage corridor, LCS drainage layer, and LCS drainage corridor to within -0.1 to +0.3 feet of the elevations and to within 0.0 to +0.1 feet of the thicknesses indicated on the Construction Drawings.
- B. Construct the cover drainage layer to 0.0 to +0.2 feet of the elevations and to within  $\pm 0.1$  feet of the thickness shown on the Construction Drawings.

[END OF SECTION]